
Volume 3. Air Operator Technical Administration

CHAPTER 15. MANUALS, PROCEDURES, AND CHECKLISTS

SECTION 5. AIRCRAFT CHECKLISTS

2197. GENERAL. This section contains direction and guidance for principal operations inspectors (POI) for the review of aircraft checklists for Federal Aviation Regulations (FAR) Parts 121 and 135 operators. All FAR Parts 121 and 135 operators must provide aircraft checklists to their flight crewmembers. Flight crewmembers are required to use these aircraft checklists in air transportation operations. For FAR Part 121 operators, aircraft checklists must be approved by the Federal Aviation Administration (FAA), and for FAR Part 135 operators these checklists must be acceptable to the FAA (see section 1 of this chapter for definitions of acceptance and approval).

A. Definition. A checklist is a formal list used to identify, schedule, compare, or verify a group of elements or actions. A checklist is used as a visual or oral aid that enables the user to overcome the limitations of short-term human memory. Although a checklist may be published in a manual, it is designed for independent use so that the user does not have to reference a manual. Checklists are used to ensure that a particular series of specified actions or procedures are accomplished in correct sequence. Aircraft checklists, in particular, are used to verify that the correct aircraft configuration has been established in specified phases of flight.

B. Standardization. Aircraft checklists and the operator's policies for the use of checklists are one means by which operators structure and define flight crewmember roles. Research has shown that standardized procedures and effective cockpit communications are significant factors in flight safety. POI's must review the operator's policies and procedures for checklist use as an integral part of the checklist review process. POI's shall ensure that checklists and the operator's procedures for checklist use are standardized (to the extent allowed by individual aircraft differences) for all aircraft in the operator's fleet.

C. FAA Approval or Acceptance for Specific Operators. POI's and operators must understand that aircraft checklists published in airplane flight manuals (AFM) or rotorcraft flight manuals (RFM) are not approved by the Aircraft Certification Office (ACO). When a FAR Part 121 operator proposes to use an AFM checklist, the POI must review and approve that checklist for that operator. When a FAR Part 135 operator proposes to use an AFM or RFM checklist, the

POI must review the checklist and determine that it is acceptable for that operator's use.

2199. CHECKLIST CONTENT. Aircraft checklists have traditionally been divided into three categories. For the purpose of this handbook, these categories are referred to as normal, nonnormal, and emergency. Operators may use other titles for these categories, such as abnormal instead of nonnormal. Operators may also further divide these categories into subcategories, such as alternate and supplemental. POI's shall use the following guidance when evaluating the content of an operator's checklists.

A. Content. POI's shall ensure that aircraft checklists are limited to action items or verification items. The aircraft checklist should not contain elaboration or explanation. POI's must ensure that the required actions and decisions for flightcrews when performing a checklist are thoroughly described in the operator's manual and training program. POI's should consider the following when evaluating aircraft checklist content:

(1) Nonnormal and emergency checklists must contain each sequential step of a procedure.

(2) A normal checklist is typically a listing of action items to be performed and verified at a particular point in flight. Normal checklist items do not necessarily represent a procedural step and may even represent completion of an entire procedure. For example, the item "Gear - Up and Locked" could indicate that the gear handle had been raised, the gear indications checked, the gear handle had been placed in the neutral position to check the up-locks, and that the handle had then been returned to the up position. Most normal procedures do not require itemization or incorporation into a checklist. For example, the procedures for making normal takeoffs and landings are not itemized in a checklist format but described in a narrative format.

B. Criticality of Checklist Items. Checklist items can be ranked in criticality according to the potential effect of the crewmember failing to perform the action. Critical items are those items which, if not correctly performed, have a direct, adverse effect on safety. Noncritical items are "house-keeping" items or systems management items, which for operating practices must be routinely accomplished during a

specific phase of flight, but if omitted would have a minimal effect on safety. An item may be considered to be critical on one checklist but noncritical on another checklist. For example, a flightcrew's failure to set the flaps while accomplishing the before-takeoff checklist has had extremely adverse consequences. A flightcrew's failure to retract the flaps while performing the after-landing checklist, however, has had little effect on safety. The operator and POI shall analyze each phase of flight to identify critical items for that phase of flight and to ensure that all critical items are included on the checklist.

C. Diversion of the Flightcrew's Attention. The flightcrew's attention is diverted from other tasks when performing a checklist. Checklists must be kept as short as practical to minimize "heads-down" time and diversion of the crew's attention while performing the checklist.

(1) Each additional item that is added to a checklist increases the potential for interruption when the checklist is accomplished, diversion of the crew's attention at a critical point, and the missing of critical items. Operators and POI's must weigh the benefit of including each item on a checklist against the possible adverse effects.

(2) Items not associated with aircraft operations (such as calls to the company) shall not be placed on the checklist.

D. Aircraft Sophistication and Checklist Design. The degree of technological sophistication in the design of the aircraft directly affects checklist items. In older aircraft, the flightcrew must manually select and monitor most items. In technologically advanced aircraft, the same items are accomplished and monitored by automatic systems that relieve the flightcrew of these tasks. Checklists for technologically advanced aircraft tend to be shorter and simpler than those for older aircraft. POI's shall ensure that the operator's aircraft checklists are based on a careful task analysis of the operational requirements of the specific aircraft.

E. Fleet Standardization. POI's shall ensure that operators standardize checklist items and the sequence of items to the extent allowed by individual aircraft differences across all aircraft in the fleet. Checklists for technologically sophisticated aircraft are typically shorter and simpler than those for older aircraft. The items on checklists for technologically advanced aircraft, however, are normally present on checklists for aircraft with older technology. POI's shall require operators to evaluate the feasibility of placing common checklist items on checklists with standard titles for all aircraft (such as before-start, before-takeoff, or before-landing checklists). Items should appear in a standard sequence to the degree possible. POI's should not normally approve placing an item on a checklist that is not required for that specific aircraft solely because the item is required in other aircraft of the fleet. POI's may make exceptions, however, when the operator provides adequate justification.

2201. METHODS OF CHECKLIST DESIGN. Operators may choose from at least two accepted methods of checklist design: the "challenge-do-verify" (CDV) method and the "do-verify" (DV) method. Available evidence suggests that safety is enhanced when the operator adopts and applies a consistent checklist design policy. POI's should use the following informative guidance when reviewing the design of an operator's aircraft checklists.

A. "Challenge-Do-Verify." The CDV method consists of a crewmember making a challenge before an action is initiated, taking the action, and then verifying that the action item has been accomplished. The CDV method is most effective when one crewmember issues the challenge and the second crewmember takes the action and responds to the first crewmember, verifying that the action was taken. This method requires that the checklist be accomplished methodically, one item at a time, in an unvarying sequence. The primary advantage of the CDV method is the deliberate and systematic manner in which each action item must be accomplished. The CDV method keeps all crewmembers involved (in the loop), provides for concurrence from a second crewmember before an action is taken, and provides positive confirmation that the action was accomplished. The disadvantages of the CDV method are that it is rigid and inflexible and that crewmembers cannot accomplish different tasks at the same time.

B. "Do Verify." The DV method (or "clean-up" method) consists of the checklist being accomplished in a variable sequence without a preliminary challenge. After all of the action items on the checklist have been completed, the checklist is then read again while each item is verified. The DV method allows the flightcrew to use flow patterns from memory to accomplish a series of actions quickly and efficiently. Each individual crewmember can work independently, which helps balance the workload between crewmembers. The DV method has a higher inherent risk of an item on the checklist being missed than does the CDV method.

C. Selection of Design Method. Both the CDV and the DV methods of checklist design are currently being successfully used for normal checklists. Traditionally, operators have preferred the DV method for normal checklists and the CDV method for nonnormal and emergency checklists. Operators have, however, successfully used the CDV method for all checklists. POI's may approve either method for normal checklists. In most circumstances nonnormal and emergency checklists are more effective when the CDV method is used. The correct accomplishment of the actions and procedures incorporated in the nonnormal and emergency checklist categories is critical and warrants a methodical approach. Since these checklists are seldom used, however, crewmembers are usually not as familiar with the procedures incorporated into these checklists as they are with the procedures in normal checklists. In addition, many nonnormal and emergency checklists do not lend themselves

to developing flow patterns that crewmembers can readily recall. The CDV method also enforces crew coordination, cross-checking, and verification, all of which aid the crewmember in overcoming the adverse effects of stress. POI's should not approve or accept the DV method for nonnormal or emergency procedures unless the operator can provide substantial evidence that the method is effective for this application.

D. Mechanical or Electronic Checklists. Mechanical or electronic devices differ in format from paper, hand-held checklists, but not in the design method or use. The actions these checklists contain and their sequencing shall be consistent with the paper version (when required) available to the flightcrew. Some electronic checklists will have an ability to automatically detect the completion of an action based on switch position, system state, or both. In electronic checklists, the verification in the CDV or DV methods may be a matter of observing that the items are complete via the display method used (for example, completed items turn green). The CDV or DV methods can be applied to any type of checklist. POI's should encourage the use of such aids when operators find them effective.

E. Verification. POI's should keep in mind that all checklist designs are subject to human error. Crewmembers may omit and skip checklist items. Crewmembers may erroneously respond to a checklist at times believing that an item or task was accomplished when it was not. At times, crewmembers may see what they expect to see rather than what has actually been accomplished. Both the CDV and the DV methods are subject to such human errors. POI's must ensure that operators have developed policies for using checklists that require stringent cross-checking and verification to overcome these human limitations. These policies must be compatible with the operator's crew resource management (CRM) philosophy. POI's shall review the operator's policies as an integral part of the review process.

2203. POLICIES FOR MANAGING THE ACCOMPLISHMENT OF CHECKLISTS. POI's must ensure that the appropriate sections of the operator's manuals contain the specific crewmember responsibilities for monitoring, verifying, and managing the accomplishment of checklists. These responsibilities should appear either as policy statements or as specific directives. POI's should use the guidance that follows when evaluating an operator's policies for the accomplishment of checklists.

A. Objective of Policy Statements and Directives. The primary objective of the operator's policy statements or directives is to standardize crewmember interaction. These statements should include, but not be limited to, the following items:

- Flightcrew responsibilities for maintaining aircraft control, analyzing situations, and for requesting the appropriate checklist in nonnormal and emergency situations
- The specified crewmember responsible for initiating each checklist
- The specified time when each checklist is to be initiated
- The specified crewmember responsible for accomplishing each item on the checklist
- The specified crewmember responsible for ensuring that each checklist is completed and for reporting that completion to the crew
- Crewmember responsibilities for bringing to the attention of the pilot-in-command (PIC) and the rest of the crew any observed deviation from prescribed procedures

B. Methods for Managing Checklist Accomplishment.

The following subparagraphs each contain a discussion of recommended methods an operator may use for managing checklist accomplishment. These methods are not all-inclusive and may not meet all of the operator's needs. POI's shall not interpret these methods as the only ones that are acceptable.

(1) For single-pilot aircraft, the FAA recommends that operators mount the before-takeoff checklist and the before-landing checklist on the instrument panel by means of a placard. When aircraft characteristics allow, the operator should develop touch-verification procedures that contain a requirement that the pilot touch each control to verify it is in the correct position.

(2) For two-pilot aircraft in which only the PIC has ground steering control, the recommended method for accomplishing checklists is for the second-in-command (SIC) to read all checklists when the aircraft is in motion on the ground. The recommended method for those aircraft in which either pilot can steer on the ground is for the pilot-not-flying (PNF) to read all checklists. In all two-pilot aircraft, the PNF should read all checklists when the aircraft is airborne.

(3) For three-crewmember aircraft, the recommended method is for the SIC to read the flight engineer (FE) portion of the before-engine-start checklist, so that the PIC can observe and verify the configuration of the FE panel as the FE responds to each item on the checklist. Since the PNF is the crewmember most subject to interruptions from radio communications, it is recommended that the FE should read all normal checklists and verify that each pilot action has been taken when the aircraft is in motion. The FE should have the explicit task of verifying that critical items have been performed by the pilots, whether or not the FE has verbal responses for those items. In those nonnormal or emergency situations that involve significant activity by the FE, it is recommended that the PNF read the

checklist and verify FE actions while the FE performs and responds to the items.

(4) For all aircraft, the crewmember responsible for reading the checklist should be responsible for ensuring that the checklist is completed systematically and expeditiously. This crewmember should be responsible for managing interruptions, cross-checking controls and indicators to ensure that the required actions have been accomplished, and for reporting that the checklist has been completed.

(5) The pilot-flying (PF) should not be distracted from controlling the aircraft to perform a checklist item that another crewmember can accomplish. The PF should activate only those switches or controls (other than the manual or automatic flight controls, throttles, and nosewheel steering) that are not within practical reach of another crewmember. Only one pilot should be “heads down” at any time.

(6) In the prestart phase, flight guidance and navigation checklist items have proven to be critical items. A response should be required from both pilots (and FE, if applicable) when the same setting is required for more than one device (such as computers, flight instruments, and altimeters). Inertial platform alignment and computer programming should be accomplished by one crewmember and independently confirmed by another crewmember. As many of these checklist items as possible should be accomplished and verified before the aircraft is moved.

(7) In the taxi and pretakeoff phases, aircraft configuration (such as flaps, trim, and speedbrakes) and flight guidance items (such as heading, flight-director, altitude select panel settings, and airspeed bugs) have proven to be critical. All flight crewmembers should confirm these items, and at least two crewmembers should respond to applicable checklist items.

(8) On approach, flight guidance checklist items have proven to be critical items. At least two crewmembers should confirm and respond to these items. A response should be required from each pilot when the same setting is required on two separate devices (such as computers, flight instruments, or altimeters).

NOTE: One operator was able to reduce altitude deviations from an average of two per week to one per quarter by using stringent procedures for setting and verifying the altitude alerter.

(9) All checklist items that are critical in the before-landing phase vary with the type of airplane involved. In the operation of small airplanes, the landing gear has proven to be a critical checklist item, and both pilots should confirm and respond to this item. Although the landing gear and flaps are critical items for large, transport category airplanes, the multiple warning devices and systems that are

associated with these systems make the need for a response and confirmation by both pilots less critical.

(10) All checklists, except the after-takeoff and after-landing checklists, should be accomplished by one crewmember reading the checklist items and a second crewmember confirming and responding to each item. POI's shall ensure that critical items on the before-takeoff and before-landing checklists are confirmed and responded to by at least two crewmembers.

(11) All checklists must be designed so that the flightcrew can maintain an adequate visual scan and monitor air traffic control (ATC) communications while simultaneously controlling the aircraft. The recommended method is for the operator to group the systems management checklist items after the configuration, thrust, and flight guidance items for each phase of flight. When systems management checklist items must be accomplished in a high workload environment, it is recommended that they be accomplished by a single crewmember. Usually the after-takeoff and after-landing checklists items can be accomplished silently as these items have not proven to be critical. POI's should carefully evaluate the operator's overall operation and experience before approving other checklists in which a single crewmember may accomplish a checklist.

(12) Operators should direct crewmembers to refrain from accomplishing action items assigned to other crewmembers. Crewmembers should be directed that when they observe that another crewmember is not taking or has not taken a required action they must inform the crewmember, the PIC, or the whole crew, as appropriate.

(13) Checklists should not be depended on to initiate changes in aircraft configuration. Operators should key aircraft configuration changes to specific operational events. For example, the operator may direct the landing gear to be extended at glideslope intercept. For any adjustment of thrust, or configuration, a command from the PF and an acknowledgement from the crewmember taking the action is required.

(14) Flight crewmembers frequently cannot complete a checklist when initiated either because of an interruption or because an item on the checklist has not yet been accomplished. POI's shall ensure that each operator has developed policies for the management of these situations. For short delays, the recommended policy is for the flightcrew to hold the checklist until the interruption is over and the item can be completed. When the checklist item is completed, the challenge should be repeated, the proper response given, and the checklist continued. POI's shall not accept policies that allow flightcrews to skip checklist items that have not been completed and then to depend on memory to accomplish the item later. When a mechanical or electronic device allows checklist items to be accomplished

in a random sequence, the POI may allow policies appropriate to the system used.

(15) *WITHDRAWN—CHG 10*

C. Checklist Interruptions. Operators must establish procedures to ensure that the correct checklist sequence is reestablished when unusual events interrupt the normal sequence of a flight. For example, crewmember actions during normal sequences of flights are interrupted when long delays are encountered on taxi-out or when crewmembers vacate the flight deck.

(1) *Vacating Flight Deck with Visitors in Cockpit.*

Operators must establish additional checklist management procedures for checklist interruptions that occur when any flight crewmember who is assigned to a flight deck duty station vacates the cockpit to perform other duties, leaving persons who are occupying cockpit observer seats or who visit the cockpit during such absence with unsupervised access to unmanned flight deck duty stations. If any checklist interruption of this kind occurs and any person, other than those specified in FAR §§ 121.547(a), 121.583(a)(1) through (3) or 135.85(a) and (f), has unsupervised access to an unmanned flight deck duty station, then each checklist item in all of the checklists prior to engine start must be reaccomplished.

(2) *POI Responsibilities.* FAR Part 121 POI's shall ensure that their assigned certificate holders conform to the policies described in this subparagraph. FAR Part 135 POI's shall encourage their assigned certificate holders to conform to these policies.

NOTE: The following policies apply when interruptions of checklists occur before engine start; are caused by the vacating of an assigned flight deck duty station by one or more flight crewmembers to perform duties outside the flight deck; and any person, other than those specified in FAR §§ 121.547(a), 121.583(a)(1) through (3) or 135.85(a) and (f), occupies a cockpit observer seat or has access to the cockpit during the flight crewmember's absence.

(3) *Verification of Items Accomplished.* The flightcrew must verify the accomplishment of all items on checklists that have been accomplished up to the point where the current checklist was interrupted.

(a) *Minimum Requirement.* As each checklist item is reaccomplished, the minimum that is required is a verification that switches, control handles, knobs, or levers are in the positions prescribed and that the associated indicator lights and instrument readings confirm the proper positioning of the applicable switches, control handles, knobs, or levers.

(b) *Additional Requirements.*

1. If the verification check reveals that any switch, control handle, knob, or lever is not in the position prescribed, then the full procedure, including any associated checks for the particular checklist item(s), must be reaccomplished.

2. If the indicator lights or instrument readings associated with the proper positioning of particular switches, control handles, knobs, or levers are not in agreement with the prescribed positions of these control means and reaccomplishment of the full procedure, including any associated checks for the particular checklist item(s), does not correct the disagreement, then the flightcrew must log the discrepancy in the aircraft maintenance log. The operator must either correct this discrepancy before the next flight or, if permitted, defer correction in accordance with the certificate holder's approved minimum equipment list (MEL) procedures.

2205. DEVELOPMENT AND SEQUENCING OF CHECKLIST ITEMS. POI's must ensure that checklists are developed from a careful task analysis and are consistent with the procedures section of the operator's flight manual. Phase checklist items must be in an appropriate and logical sequence. When a checklist represents an abbreviated procedure, that checklist must follow the procedural sequence. POI's should use the following additional guidelines concerning individual topics of checklist design.

A. Operators should standardize the sequence of checklist items as much as possible across aircraft types (see subparagraphs 2199D and E).

B. When the operator has a choice as to where an item should be placed on a checklist, it should be placed at a point where the crew workload is lowest.

C. Operators should keep checklists as short as possible in order to minimize interruptions. When an operator is using an electronic checklist with the ability to automatically detect the completion of an action, the POI shall encourage the use of that ability to the maximum extent possible.

(1) Operators should sequence checklist items to minimize interruptions of checklist accomplishment. For example, sequencing the "INS NAV MODE" as the first item on the engine-start checklist may allow the flightcrew to call for and complete the before-engine-start checklist at a convenient time even though INS alignment is not complete.

(2) Two short checklists may be preferable to a single long one. Operators may place a line or otherwise mark a checklist where the checklist can be held until a specific event occurs. This practice is acceptable because in essence, it creates two separate checklists.

D. Operators must include required preflight tests on

checklists, but should design checklists to preclude the unnecessary testing of systems.

(1) Warning systems with built-in test and automatic monitor circuits do not need to be checked or included on checklists unless required by the AFM.

(2) Many test switches in the cockpit are designed for use by maintenance personnel. Operators should not require flight crewmembers to perform these tests as a normal procedure.

(3) With concurrence of the aircraft evaluation group (AEG), POI's may approve the operator grouping required functional checks on a specific checklist which is performed before the first flight of the day (or at some other logical interval) and not repeated on subsequent flights.

E. Operators must clearly identify decision points and indicate the correct alternative action or alternative sequence of actions to be taken after each decision point. If the effect of adverse weather requires an alternate action, the operator should design the checklist to account for that alternate action. For example, if the autothrottles are normally engaged for takeoff except when engine anti-ice is being used, the checklist should contain a requirement that the autothrottles cannot be engaged with the engine anti-ice on.

2207. IMMEDIATE ACTION ITEMS. Immediate action items are those items accomplished from memory by crewmembers in emergency situations before the checklist is called for and read.

A. A flightcrew's failure to correctly accomplish all immediate action items can result in a threat to continued safe flight. For example, should a flightcrew fail to close the tank valve during an engine fire procedure, leaking fuel in the engine pylon may be ignited. In such cases, the first items on the corresponding checklist must be a verification that each immediate action item has been accomplished.

B. In some cases, an immediate action procedure may not be incorporated in a checklist. For example, there is no point in verifying that each item of an aborted takeoff procedure has been accomplished after the aircraft has been brought to a stop. In most cases, however, there should be a "follow-on" or "clean-up" checklist to be accomplished after the situation has been brought under control.

C. Another example of an immediate action memory item is the following statement: "All flight crewmembers shall immediately don O₂ masks and report to the captain on interphone in the event of loss of cabin pressure." In this example, the loss-of-cabin-pressure checklist would contain the immediate action memory item and subsequent follow on items to verify that each item has been accomplished.

2209. CHECKLIST TERMINOLOGY. POI's should ensure that the operator's aircraft checklists contain terminology that is tightly controlled to ensure clarity and

common understanding. The following recommendations should be considered by POI's when reviewing checklists.

A. The challenges and responses on the checklist should be consistent with the labeling on the switches and controls in the cockpit.

B. Terms such as "tested," "checked," and "set" are acceptable terms only when they are clearly defined and consistently used.

C. Operators should have a consistent policy concerning responses to items with variable settings. "As required" may be printed on the checklist, but should not be an authorized response. A response that gives the actual setting is normally appropriate. Items that require variable responses should be carefully evaluated. Such items may not actually be required on the checklist or may be more appropriately included in the system management portion of a checklist.

D. Responses to checklist items concerning liquid or gas quantities should be made in terms of the actual quantities on board compared to the specific quantity required, for example: "10,000 pounds required, 10,400 on board." When specific quantities are required, a response of "checked" is not acceptable. A response of "checked" is acceptable when a range of quantity is permitted and the range is marked on an indicator, such as a green arc on an oil quantity gauge.

E. Excess verbiage on checklists should be discouraged. For example, a checklist item of "Reduce airspeed to 130 KIAS for best glide" can be abbreviated as "BEST GLIDE - 130 KIAS."

F. Ambiguous verbiage on checklists is not acceptable. For example, "takeoff power" can mean either to advance the power or to retard the power.

2211. AIRCRAFT DIFFERENCES. POI's shall ensure that operators account in the aircraft checklists for differences in various series of aircraft or in installed equipment. When there are only a few minor differences, this may be accomplished by using symbols to designate those checklist items that apply to only one series of airplanes or that apply only when the equipment is installed. When there are a significant number of differences, operators should prepare separate checklists for each series of aircraft. Policies and procedures should be established to account for differences in checklist responses when operations are conducted with equipment removed or inoperative, in accordance with MEL's and configuration deviation lists (CDL).

2213. SEQUENCING NORMAL CHECKLISTS AND OTHER CHECKLISTS. Normal checklist items may be incorporated in nonnormal or emergency checklists to simplify cockpit management. An acceptable alternative method is to require both the normal and nonnormal or emergency checklists to be accomplished in a specified sequence. This method has the advantage of allowing the

normal checklist to be requested and accomplished at the time that it would normally be accomplished. Checklists should be designed so that two checklists are not in progress simultaneously. The method may depend on the degree of sophistication of the airplane involved. In technologically advanced aircraft with short, simple checklists, it is usually preferable to keep the normal and the nonnormal checklists separate. Some nonnormal checklist actions may be deferred until initiation of the appropriate normal checklist. In airplanes with electronic checklists, checklists may be combined based on the priority of any one action, and/or the deferred nonnormal checklist items may be automatically inserted in the appropriate normal checklist. In older airplanes, however, it may be necessary to add the normal checklist items to the nonnormal or emergency checklist simply to keep the checklist manageable.

2215. CHECKLIST FORMAT. POI's shall ensure that operators present checklists to flightcrews in a practical and usable format. POI's should use the following guidance when evaluating aircraft checklists for proper format.

A. Paper checklists should be protected either by plastic lamination or by being printed on heavy, folded pasteboard stock.

B. Nonnormal, alternate, and emergency checklists must be in a format that allows crewmembers to quickly and accurately find the correct procedure while the crewmember is under stress. To expedite the referencing of these checklists, a tabbed manual or other quick reference format is recommended. When a paper checklist is required on the airplane, the methods used in an electronic checklist and the associated paper checklist for referencing a particular checklist shall be sufficiently similar to minimize flightcrew confusion or inappropriate flightcrew response. The methods for accessing electronic checklists may determine

the format used to reference checklists in the paper version.

C. For single-pilot aircraft, the before-takeoff checklist and before-landing checklist can be appropriately presented as placards on the instrument panel.

D. The type size and contrast used on a checklist is a compromise. A large type size is preferred for legibility. A small type size is preferred to keep the number of checklist pages to a minimum, which then further ease the locating of a specific checklist. The legibility of printed material depends on the size of the letters, the spacing between letters, and the type of font used. The following is offered as a suggestion to POI's for what to consider in evaluating the legibility of checklists. This guidance must not be interpreted as being the only acceptable print size and contrast that can be used for checklists:

- Checklist headings or titles—12 point type, all caps, boldface, and a plain (sans serif) font
- Checklist text (challenge and response) and notes—10 point type, boldface, and a plain (sans serif) font
- Contrast for headings or titles—either black print on white or reversed for emphasis
- Contrast for text—black print on white
- Colored borders for ease of identification—green for normal checklists, yellow for nonnormal checklists, and red for emergency checklists

NOTE: On airplanes with electronic checklists, these selections should be consistent with the display and symbology standards used by that system.

2216.-2226. RESERVED.

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